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Great Lakes Science Advisory Board. Workgroup on Ecosystem Health

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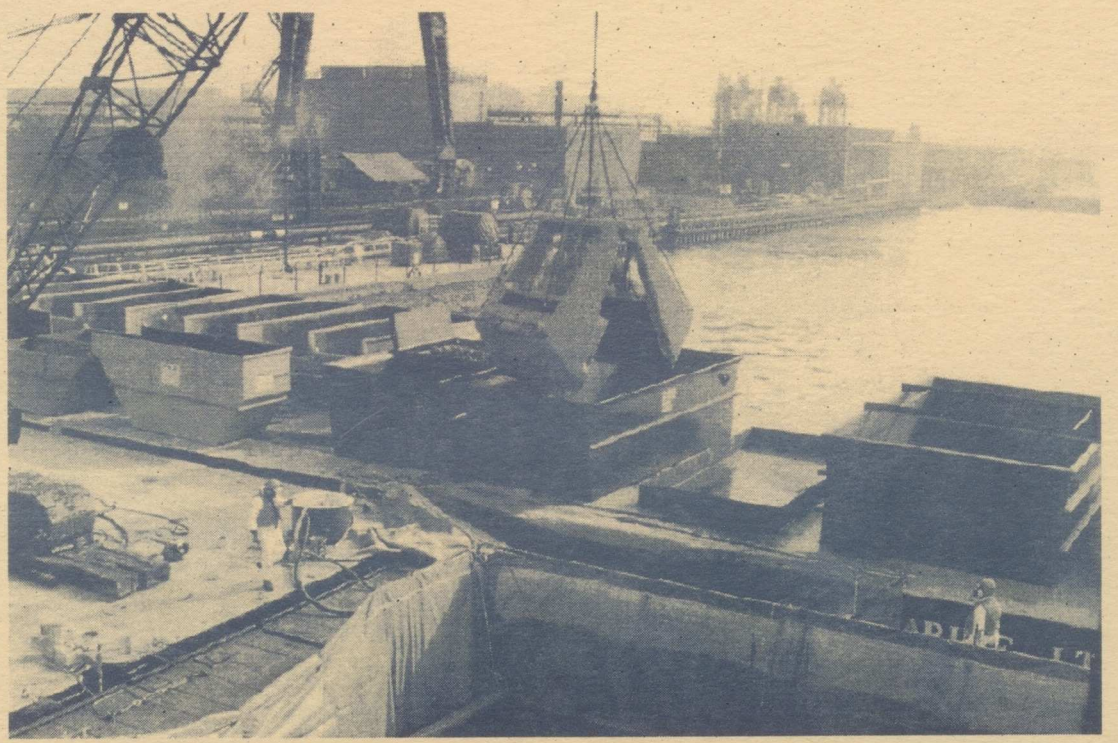
WORKSHOP ON POLICY IMPLICATIONS OF EVIDENCE REGARDING PERSISTENT TOXIC SUBSTANCES AND HUMAN HEALTH



Workgroup on Ecosystem Health
Report to the Great Lakes Science Advisory Board

September 5-7, 1997, Wingspread Conference Center
The Johnson Foundation, Racine, Wisconsin

International Joint Commission
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DISCLAIMER

This report to the Great Lakes Science Advisory Board from the Workgroup on Ecosystem Health was carried out as part of Board activities related to the 1995-97 Priorities under Priority 1 — Persistent Toxic Substances: Impact on Humans and Ecosystem Health. While the Commission supported this work, the specific conclusions and recommendations do not necessarily represent the views of the International Joint Commission, the Science Advisory Board or its workgroups.

Workshop Rationale

During the past 30 years, there has been a growing knowledge among epidemiologists and pediatricians of the occurrence of developmental effects on human fetuses and infants following exposure to toxic substances. Similarly, since the 1960s, wildlife biologists have reported observations of reproductive and developmental effects of toxic substances in populations of wildlife, particularly in the Great Lakes basin. Human health researchers, working in the Great Lakes basin, have reported subtle perinatal effects on growth and neurological development associated with *in utero* exposure to toxic substances from maternal consumption of Lake Michigan fish. These effects have been shown to persist in children through an eleven year period and are consistent with effects related to dioxin-like chemicals observed in other studies both in humans and animals. In an effort to understand the extent of these effects and the populations at greatest risk, the United States and Canadian governments as Parties to the Great Lakes Water Quality Agreement, have, in the past five years, funded about $30 million in research grants for Great Lakes health projects. In May 1997, the United States Agency for Toxic Substances and Disease Registry (ATSDR), Health Canada and the Quebec Ministry of Health and Social Services jointly sponsored a scientific conference in Montreal to present the results of these projects.

The International Joint Commission (IJC) directed its Great Lakes Science Advisory Board to hold a workshop on the policy implications of this evidence to determine how this knowledge can be applied to sustain progress under the Great Lakes Water Quality Agreement (GLWQA). Thirty invited participants, including senior regulatory officials from health and environment departments, industry, environmental non-government organizations (ENGO) and the academic science and policy communities, attended the workshop held at the Wingspread Conference Center on September 5-7, 1997. The participants had received a draft document from ATSDR entitled "Public Health Implications of Persistent Toxic Substances in the Great Lakes and St. Lawrence Basins" for review prior to the workshop. The ATSDR report reviews the existing body of knowledge regarding the neurodevelopmental, immunological, endocrinological and other effects of many persistent toxic substances on human fetuses, and identifies the need for public health interventions based on these findings. The research presented at the Montreal conference is consistent with the earlier research findings. This report concluded that:

"the findings of elevated polychlorinated biphenyl levels in human populations, together with the findings of developmental deficits and neurological problems in children whose mothers ate PCB-contaminated fish, have significant health implications. The weight of evidence based on the findings of wildlife biologists, toxicologists and epidemiologists clearly indicates that populations continue to be exposed to PCBs and other contaminants and that significant health consequences are associated with these exposures."

The purpose of the Policy Implications Workshop was to propose policy options to respond to the evidence and to consider the consequences and implications of these policy options. This workshop report outlines a number of policy recommendations that the International Joint Commission may wish to include in the Ninth Biennial Report on Great Lakes Water Quality to be submitted to the Parties in 1998. In addition, the report will serve as a background document for further consultation by the Commission with interested groups.

Urgency for Action

The participants at the Wingspread workshop agreed that sufficient evidence is available to demonstrate that exposures to certain toxic substances, including PCBs and related chemicals, have been sufficient to harm human health. Without interventions, future exposures will continue to harm human health. In addition, other chemicals that cause endocrine disruption have the potential to harm and may already have harmed human populations. These substances for the most part are persistent in ecosystems and bioaccumulate in food chains on which certain populations of humans rely for their nutrition. The participants agreed that, while it is essential to continue to undertake research to understand these phenomena and set priorities, there is sufficient available research at this time to justify urgent action to protect public health. The participants agreed that:-

- The Commission recommend that the Parties undertake a renewed and strengthened effort to eliminate from the Great Lakes environment, those substances responsible for the human health effects documented in the report of the Agency For Toxic Substances and Disease Registry.

Strategic Policy Directions of the Parties

On April 7, 1997, prior to the compilation of the ATSDR review, the Parties signed a binational toxic substances strategy. This action had been recommended to the Parties in the Seventh and Eighth Biennial Reports of the IJC. The binational strategy commits the Parties to undertake a coordinated effort to rid the Great Lakes of toxic chemical pollution.

The governments stated that they are committed to continue on their path towards virtual elimination of persistent toxic substances resulting from human activity. While the strategy provides a framework to achieve specific actions between now and 2006, with specific milestones along the path, it does not include remedial work on sediments or landfill sites which are major sources of persistent toxic substances to the Great Lakes. In addition, the governments stated that they placed a primary emphasis on "pollution prevention" directed primarily to "Level I Substances" that include the 11 critical pollutants identified by the International Joint Commission (aldrin/dieldrin, benzo(a)pyrene, DDT (DDD, DDE), hexachlorobenzene, alkyl-lead, mercury and compounds, mirex, PCBs, PCDD (dioxins) and PCDF (furans), toxaphene), as well as chlordane and octachlorostyrene. This list of 11 critical pollutants is larger than the small group of substances identified by ATSDR to be associated with the effects on human health. The main substances identified as the cause of the effects on human health are PCB and dioxins. Based on these observations:-

- The Commission commend the Parties for undertaking a binational toxic substances strategy that sets out long-term goals and targets along the way. The Parties should be urged to meet or exceed the specific action goals and the milestones that have been set out within the strategy.

- The Parties report to the IJC, progress in achieving these goals and milestones.

- The Commission review the adequacy of the actions contained in the binational strategy to meet the objectives of the Great Lakes Water Quality Agreement to "restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem," particularly in relation to the impact they may have on remediation of chemical landfill sites and contaminated sediments.

Sources and Pathways of Critical Pollutants

The participants identified sources of these critical pollutants and environmental pathways leading to routes of human exposure associated with the human health effects. Some substances, such as PCBs, are still in use, or are in hazardous waste storage sites and can thereby escape into the environment through direct discharges, to municipal sewers and non-point sources. Substances, such as dioxins, are in contaminated landfill sites and are leaching into the environment and have accumulated in sediments. Most of the organochlorine pesticides are no longer permitted for use in Canada or the United States, but some, such as chlordane are still registered for some uses. Organochlorine pesticides are extensively used for agriculture and malaria control in developing nations. Runoff from agricultural land contains residues from the current and historic use of pesticides. As well as local contamination, chemical manufacturing and industrial and agricultural use of organochlorine substances leads to contamination of the atmosphere and long-range transport to and deposition of these substances in the Great Lakes.

Control at the source or elimination of the source are the most effective methods of "pollution prevention." Since the strategies to reduce and eliminate human exposure depend on the source of the contaminant, policy options for each source will be considered separately. Because some of the major sources to the atmosphere, other than contaminated sites and recycling within and beyond the Great Lakes ecosystem, are beyond the boundaries of the Parties, a set of recommendations for international action were also developed.

Contaminated Sites

Progress has been made in the clean-up of many contaminated sites. There are many others, some of which are designated Areas of Concern and/or Superfund sites, in the Great Lakes basin, where clean-up has been hampered by issues of cost and liability. The Parties have moved to a more collaborative approach with community and industrial partners in efforts to develop plans for implementation for restoration of sites. There is a danger that government agencies will slip into a facilitative role that ends in inaction because none of the stakeholders provides leadership. The Parties must maintain or reinstate their leadership role, wherever necessary, if remediation efforts are to proceed effectively. The participants agreed that:-

- The Commission recommend that the Parties provide effective leadership in stakeholder partnerships for the remediation of sediments and hazardous waste sites in the basin especially in Areas of Concern.

Flexibility is needed in remediation solutions and in finding funds for site clean-up. Issues of liability ought to be resolved by mediation and negotiation as much as possible, to avoid the lengthy delays that are involved in the legal method of dispute resolution. A Great Lakes Ecosystem Restoration Trust Fund could be established to draw on funding from governments, industry, foundations and others in order to undertake clean-up efforts as capital projects. Such a trust could borrow money in order to take action now. Any cost-benefit analysis of restoration efforts must consider the economic benefits that will flow from the future use of the cleaned-up site. In the long-term the repayment of borrowed capital can be spread out over 10-20 years. There are many benefits to restoration of sites. These benefits are cultural and economic (including expansion of the local tax base). They also can be intangible, such as the pleasure associated with the recreational use and the restoration of the beauty to the site. The participants agreed that:-

- The Commission recommend that the Parties facilitate solutions that remove obstacles to prompt remediation of contaminated sites that are related to liability disputes regarding the clean-up.

- The Commission recommend that the Parties facilitate creative funding solutions for clean-up projects such as the establishment of restoration trusts.

Community involvement is critical to the success of any planning and action process. The IJC should strongly urge both Parties to require and facilitate community involvement in all priority setting and clean-up efforts. Communities should be involved at every step, from setting action levels and goals for clean-up, through choosing the method of remediation for each site. This process may involve a little more time and effort at the start of each clean-up, but community involvement will save time, money and credibility in the end.

- The Commission recommend that the Parties require and facilitate community involvement in all priority setting and management of clean-up efforts.

Municipal discharges and hazardous waste site releases are still a significant pathway by which PCBs and other persistent toxic substances enter the environment. Although there has been some difficulty in finding politically acceptable solutions for the destruction of stored PCBs, a wide variety of technologies for this purpose now exists.

- The Commission recommend that the Parties develop strategies for the destruction of PCBs and other persistent toxic substances in storage on a firm timetable.

The workshop considered full cost pricing strategies for municipal water and sewage services (especially sewage treatment) as a way to sensitize communities to the issue of what is going through their sewers into aquatic ecosystems. Pricing should be adequate to cover treatment that meets clean water objectives, either by pollution control or preferably by "pollution prevention" measures. This local sensitization would create the political will to enforce responsible actions on point source parties to eliminate discharges and help in efforts to control non-point source runoff through municipal storm sewers.

- The Commission recommend that the Parties encourage the development of full cost pricing of water and sewage treatment services within their municipalities.

Current and New Chemicals

Both Parties have legislation requiring screening of new chemicals before they come into use. The screening protocols are not the same in the two countries. Many current chemicals are under review on a priority basis by government agencies to determine whether or not they are persistent, bioaccumulative or toxic. In addition to these three criteria, the U.S. Environmental Protection Agency, at the direction of the United States Congress, is developing screening protocols for testing substances for endocrine-disrupting effects. The knowledge of chemical mimicry mechanisms in the body is rapidly growing. The definition for these chemicals of concern, into legislation currently under consideration by the United States Congress, is chemicals that mimic the natural chemicals of the body in ways that can interfere with the control of human development and function. These four criteria provide a reasonable framework for identifying chemicals with the potential to function in a way

that is harmful to organisms in the Great Lakes and other ecosystems. The standard suite of screening tests should be applied to all chemicals, irrespective of their intended end use. Currently, exceptions exist for some chemicals, such as cosmetics. Testing beyond this standard suite need not necessarily be the same for all chemicals.

- The Commission recommend that the Parties in their regulatory protocols address all chemicals that mimic natural chemicals and interfere with the control of human development and function.

There have been consistent recommendations for harmonization of the regulatory standards and procedures and health information (such as fish consumption advisories) within the Great Lakes basin. This harmonization has been difficult to achieve because of differences in cultural and legal systems between the two countries and because of the necessity to get federal, state and provincial jurisdictions to agree. Nevertheless, the principle of regulatory harmonization is a desirable goal.

- The Commission recommend that harmonized standards would result in equal or greater testing stringency, not less; screening of chemicals should be harmonized regardless of the intended use.

Screening for toxic effects does not guarantee that there will be no adverse effects from the subsequent commercial or industrial use or disposal of a chemical. Liability for such consequences of the use of commercial and industrial products exists to some extent in both jurisdictions. The concept of product stewardship that has been adopted by many chemical manufacturers voluntarily accepts responsibility for the consequences of product use. The workshop participants felt that this voluntary approach was reasonable but that the principles of reverse onus and product liability could be more fully incorporated into regulatory standards and policies. Such life-cycle product liability standards should apply immediately to new chemicals. After a reasonable time limit current chemicals in order to continue in use should be subject to the same screening protocols and meet the same life-cycle product liability requirements as new chemicals. Harmonization of the testing protocols would remove red tape hassles from industry at the same time as a full burden of product liability is placed on them. It would provide an equitable standard of safety for the populations throughout the basin.

- The Commission recommend that the standard screening protocol should include screening for persistence, toxicity, bioaccumulation potential and ability to disrupt human development and function.
- The Commission recommend that the Parties set a time limit within their regulatory structures within which chemicals in current use will become subject to the testing protocols for new chemicals.
- The Commission recommend the principle of life-cycle product liability be fully incorporated into regulatory standards and policies for current and new chemicals.

The efforts to screen chemicals in current use (about 70,000 substances) is a Herculean task. An International Research Institute, to address the effort required to develop and implement the best and most efficient testing protocols, was proposed. Such an institute could be funded by governments, industry, foundations and others to ensure the credibility of the protocols developed and the testing done.

- The Commission recommend that the Parties facilitate discussion of an International Research Institute to provide unbiased quality information on the effects of commercial/industrial chemicals on human development and function.

Indicators for Monitoring and Surveillance

The Commission in its Eighth Biennial Report identified reductions in regulations, monitoring and enforcement programs by the Parties as a major issue. The Commission recommended that the Parties review these planned reductions and report to the Commission on their impacts on the ability of agreement-related programs to meet their objectives under the Great Lakes Water Quality Agreement. Such monitoring programs are essential in order to provide an early warning system for new environmental concerns that will help the Parties pinpoint potential environmental and human health problems in the Great Lakes basin.

New indicators may be required to respond to new ecosystem and health concerns related to chemicals that affect human development and function. The Parties should continue their on-going effort to identify and standardize biological indicators for human health, wildlife and plant health and environmental quality. The Parties should harmonize their monitoring throughout the basin, identifying the best indicators rather than duplicating efforts or multiplying the number of monitoring parameters. Harmonization will ensure that in the future databases can be used in common, and will allow the task of testing and evaluating chemicals of concern to be shared. Joint efforts will conserve funds, reduce the required effort, and decrease the time before results are available. Several groups and agencies (Organization for Economic Cooperation and Development, U.S. Environmental Protection Agency, Environment Canada) are making efforts in this arena. The IJC should help facilitate and coordinate some of the interagency and intergovernmental effort.

Although models based on historical trends have been used to predict future conditions in the Great Lakes ecosystem in order to make program decisions, model predictions cannot replace the actual data that follows those trends. Human health concerns should be addressed by actual monitoring of body burdens of contaminants to identify the populations at greatest risk of exposure. Risk estimates (such as cancer risk) are not enough. Human health surveillance is warranted for reproductive and respiratory outcomes and at least some cancers.

- The Commission sponsor efforts to facilitate harmonization of biomonitoring programs on the Great Lakes between the Parties.

- The Parties continue their on-going effort to identify and standardize biological indicators for human health, wildlife and plant health and environmental quality.

Mechanisms for Change

The concept of environmental justice should be a guiding principle to restore contaminated sites and clean-up contaminated sediments. The distribution of environmental health risks among social groups has not been equal in our countries. Aboriginal, immigrant and poor populations use fish and other wildlife as a major food source. The fish and wildlife food chains in the Great Lakes basin and elsewhere upon which these groups depend have been contaminated by persistent toxic substances. Restoration of a safe food supply to First Nations/American Indians, subsistence populations and others highly dependent, by tradition and economic need, on Great Lakes fish and wildlife is required. Environmental justice demands nothing less. The participants agreed that:-

- The Commission recommend that the Parties incorporate the principle of environmental justice in the allocation of resources for environmental clean-up, health services and environmental health information programs.

The participants at the workshop recognized that both regulatory and voluntary strategies based on environmental stewardship and market forces are needed. We need a corporate culture of continuous improvement including quantitative targets toward virtual elimination of persistent toxic substances that is based on pollution prevention principles. State, provincial and federal governments should support such cultural changes while providing regulatory control and enforcement for environmental standards. Non-Government Organizations and other stakeholders should be involved in both objective setting and verification. Many corporations have already undertaken programs such as Responsible Care and Natural Step that incorporate responsible environmental stewardship into their activities.

- The Commission recommend that the Parties support initiatives that shift corporate culture in the direction of environmental responsibility and stewardship.

The public needs to be much more aware of their potential exposure to chemicals that can interfere with human development and function. The participants endorsed the concept of a public right to know what chemicals they are using and being exposed to. Labeling of many products such as plastics with respect to potential chemical exposures and environmental fate is becoming feasible as our understanding of endocrine disrupting and similar chemicals grows. Labeling protocols can be guaranteed through third party certification processes. Solid information as a basis for public environmental concern should become a driving force for change through informed choice.

- The Commission recommend that the Parties require product labeling and public access to information with respect to potential chemical exposures and the environmental fate of products where this information is reliably available.

The participants also identified that there is a gap in knowledge and priorities between the environmental and public health communities that needs to be closed. Environmental health must be added to the communicable disease and chronic disease prevention efforts of the public health community. The practical importance of communicable disease control efforts and health promotion directed at the behaviourial determinants of chronic diseases needs to be recognized by environmental health professionals. The expansion of environmental health information needs to be communicated to health professionals and the concerned communities in which they operate.

- The Commission recommend that the Parties jointly conduct initiatives to educate public and clinical health professionals in the area of environmental health.

Education and Communication

The Parties should renew their efforts to inform their populations of the consequences of widespread contamination by substances that interfere with the natural chemical messengers of the body that control human development and function. The messages should include information that:

- Very low doses of certain substances affect the developing fetus if maternal exposure occurs at critical periods early in pregnancy.

- The risk of harm to the fetus cannot be precisely determined.

- The health risks from chemicals such as PCBs in the Great Lakes basin are not unusual. These contaminants are widely distributed around the globe.

- The contaminants persist in the environment. The potential for human exposure will not disappear quickly.

- The Commission relate directly to the public at the local level, not just to the Parties.

The Parties have undertaken fish consumption advisory programs but more information is needed on other routes of exposure to persistent toxic substances. Chemicals such as mercury, PCBs, dioxins and furans are widely distributed, although in very low concentrations. The main source of these contaminants is through the diet including beef, pork, fish and dairy products. The public needs useful information on ways to reduce exposure to these contaminants and practical advice that puts the risk in perspective with other risks, ie, that looks at the benefits of fish consumption and breastfeeding as well as the exposure to toxic chemicals.

In a contaminated world, pollution prevention is the only real long-term solution. In the interim people should not take measures to reduce their personal risk from toxic contaminants that increase other health risks, such as loss of essential nutrients.

The IJC should help the Parties integrate cultural sensitivity into their educational efforts directed at the people and communities within the Great Lakes basin. Working with the affected communities is essential in order to determine the most effective communication methods, and in order to frame the messages in the most appropriate manner. The Parties should consider joint annual or biennial awards for Great Lakes communities who have achieved part or all of their educational and restoration goals. The participants commend the IJC for the creation of its Web site, and recommend that it undertakes a concerted effort to continue to improve the Web site and to make more people aware that the Web site exists.

- The Commission help the Parties integrate cultural sensitivity into their educational efforts within the Great Lakes basin.

- The Commission recommend that the Parties use multilingual fish advisory formats where necessary that are customized for specific communities; the advice should consider the risks and benefits of fish consumption.

International Action

Long-range transport through the atmosphere can be a major mechanism by which persistent toxic substances enter the Great Lakes ecosystem. The Parties have been working with international partners on this issue, especially with Mexico under the North American Free Trade Agreement and the collateral environmental agreement to limit and eliminate the manufacture, use, and release of certain persistent organic pollutants (PCBs, DDT, chlordane, mercury). The United Nations Economic Commission for Europe (UNECE), of which Canada and the United States are members, has developed the Convention on Long-Range Transboundary Air Pollution. Within the context of this Convention, the Parties are completing negotiation for a Protocol on Persistent Organic Pollutants (POPs).

The Parties have been working through the World Trade Organization and the General Agreement on Tariffs and Trade (GATT) treaty to reduce barriers to trade. The Parties are negotiating a Multilateral Agreement on Investment (MAI) with other nations to facilitate the movement of investment across national borders. These initiatives may offer real economic advantages. However, the nations of the world have not yet established an international mechanism to effectively protect the environment within national states. It is critical that, when negotiating international regulatory regimes for persistent organic pollutants and other toxic substances, no commitments are made by the Parties that would weaken their commitment to restore the waters of the Great Lakes ecosystem through the Great Lakes Water

Quality Agreement. Similarly, commitments under international trade and investment agreements must not undermine the Great Lakes water Quality Agreement.

There is a role for the IJC Great Lakes advisory boards to develop an effective linkage with the North American Free Trade Agreement Commission on Economic Cooperation in order to discuss and address common environmental issues. The participants agreed that :-

- The Commission recommend that the Parties not enter into any international environmental treaty or agreement that would have the effect, directly or indirectly, of weakening the Great Lakes Water Quality Agreement, or the environmental regulatory standards, programs and policies of either country.

- The Commission recommend that the Parties not enter into any international trade, investment or similar agreement that would weaken the implementation of the provisions of the Great Lakes Water Quality Agreement or current environmental regulations, programs or policies in either country.

- The Commission recommend that the Parties implement the commitments they undertake under the United Nations Economic Commission for Europe Protocol on Persistent Organic Pollutants as quickly as possible.

- The Commission recommend that the Parties support the addition of a provision for the introduction of additional chemicals to be covered by the United Nations Economic Commission for Europe Protocol on Persistent Organic Pollutants.

- The Commission recommend that the Parties meet commitments under the United Nations Economic Commission for Europe Protocol on Persistent Organic Pollutants for research efforts to identify measures or substances to replace the use of DDT for malaria control as soon as possible.

- The Commission recommend that the Parties advocate the inclusion of Non-Government Organization on the Advisory Board for the United Nations Economic Commission for Europe Protocol on Persistent Organic Pollutants and similar international agreements.

- The Commission recommend that the Parties renew a binational initiative to address polar environmental issues in the context of collaboration with all polar nations.

Conclusions

The environmental data from the Great Lakes has shown the considerable improvement in environmental conditions, since the 1950's and 60's. The participants commend the past efforts of the Parties to clean up the Great Lakes and recommend that the IJC celebrate this achievement. However, the data for some chemicals, such as PCBs, indicates that very little improvement in environmental conditions has occurred in the past 15 years. Present practices are not likely to produce much further improvement.

There is sufficient evidence to demonstrate that dioxin-like chemicals, and possibly other chemicals affecting the endocrine system, have harmed and will continue to harm the health of humans who are more highly exposed to the substances. Some of these substances are still widely distributed in the Great Lakes ecosystem. They bioaccumulate in food chains to which humans, wildlife and fish are highly exposed. The participants agreed that, while it is essential to continue to undertake research to understand these phenomena and set priorities, there is sufficient available research at this time to justify urgent action to protect public health.

These chemical products of our lifestyle can reduce human potential and well-being. Structural changes in our economic, social and cultural systems are necessary. We need a new environmental ethic based in stewardship and sustainability to bring about these changes. The challenge for the future is great, but this challenge presents social and economic opportunities.

We must apply the precautionary principle in our management of the Great Lakes ecosystem. We should do no harm. We should avoid undue risks. Our actions must be rooted in a deep sense of environmental justice that appreciates the cultural implications of both our action and inaction. Cleaning up the Great Lakes must remain a priority for the Parties. It is not time to relax our efforts to restore the Great Lakes ecosystem.

Acknowledgments

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